

Policy Alternatives to Stimulate Private Sector Investment in Domestic Alternative Fuels

Wally Tyner

with assistance from Dileep Birur, Justin Quear,
and Jayson Beckman

- The energy policy arena is vast and includes a very wide range of demand and supply side alternatives.
- Today we are focusing only on a small subset of those options dealing with incentives to increase domestic production of alternative liquid fuels.
- Thus, we are not considering some key issues such as conservation or any of the important demand management alternatives.

- Policy objectives
 - Our basic objective is to increase domestic production of liquid fuels at the lowest cost to the government and consumers.
 - These alternative liquid fuels must be environmentally friendly.
 - There is a national security cost associated with the high level of dependence on imported oil, and the objective is to reduce that cost by developing domestic alternatives.

- How much is this national security cost of imported oil?
 - Difficult to estimate, but here are some numbers (Southern States Energy Board Report):
 - Military \$ 50 bil.
 - Direct economic \$ 40 bil.
 - Indirect economic \$125 bil.
 - Disruption \$ 85 bil.
 - Total \$300 bil.

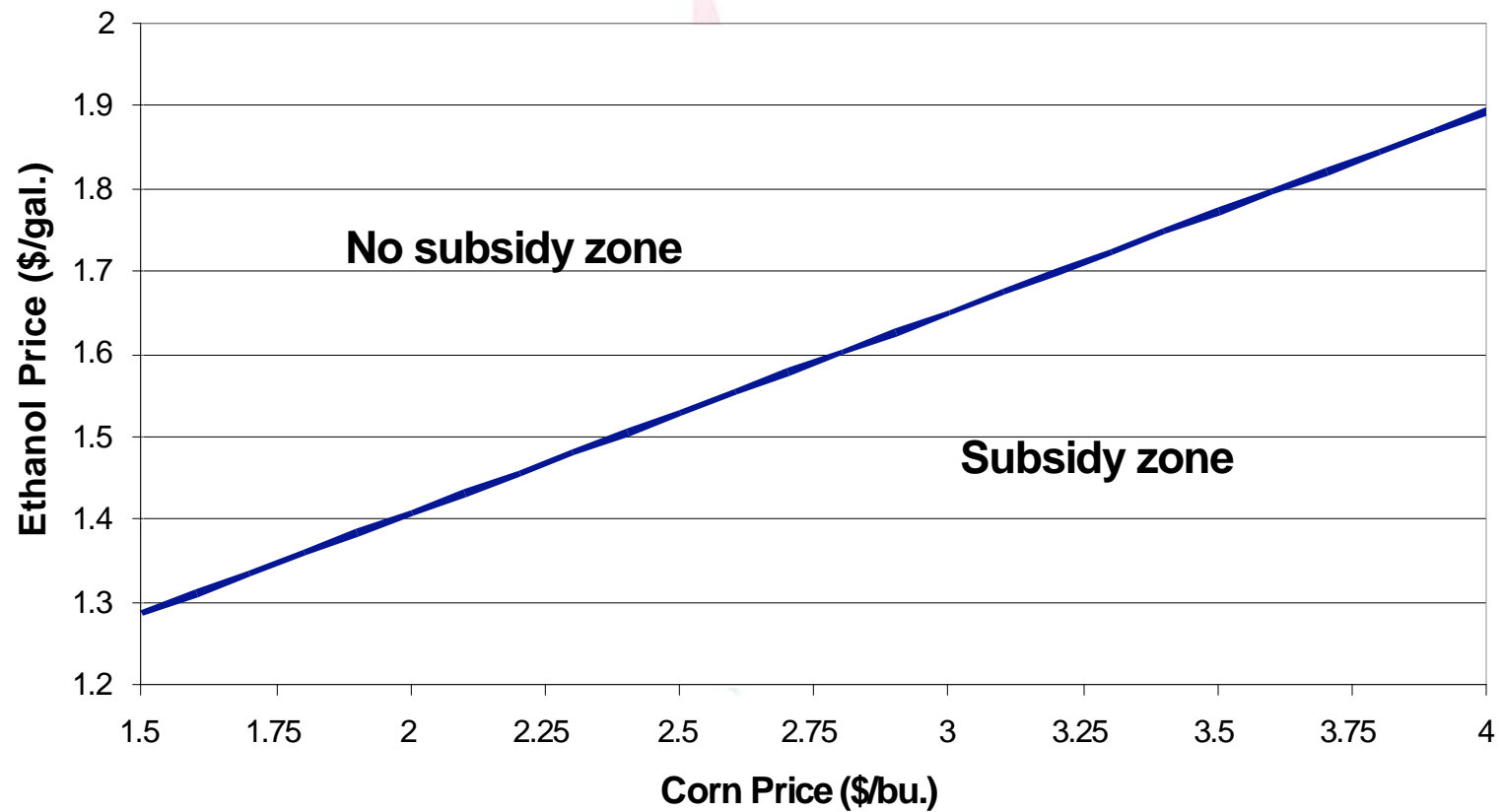
- So if we estimate that the national security costs are \$300 billion annually, and we import the equivalent of 176 billion gallons of liquid petroleum products, then the national security costs amount to about \$1.70 per gallon.
- If we are mainly concerned about the half of our oil that comes from unfriendly or unreliable sources, the cost would be \$3.40 per gallon.
- Some estimates are lower and many higher, but this gives us an idea.

- What are we doing now?
 - We have a wide range of policies in place, many of which are not clearly focused on the main objectives or are not cost effective.
 - For ethanol and bio-diesel, we have fixed subsidies that do not vary in any way with market conditions.
 - For other liquids, we have used loan guarantees, tax credits, and other options that may not effectively target the needed market risk reduction.

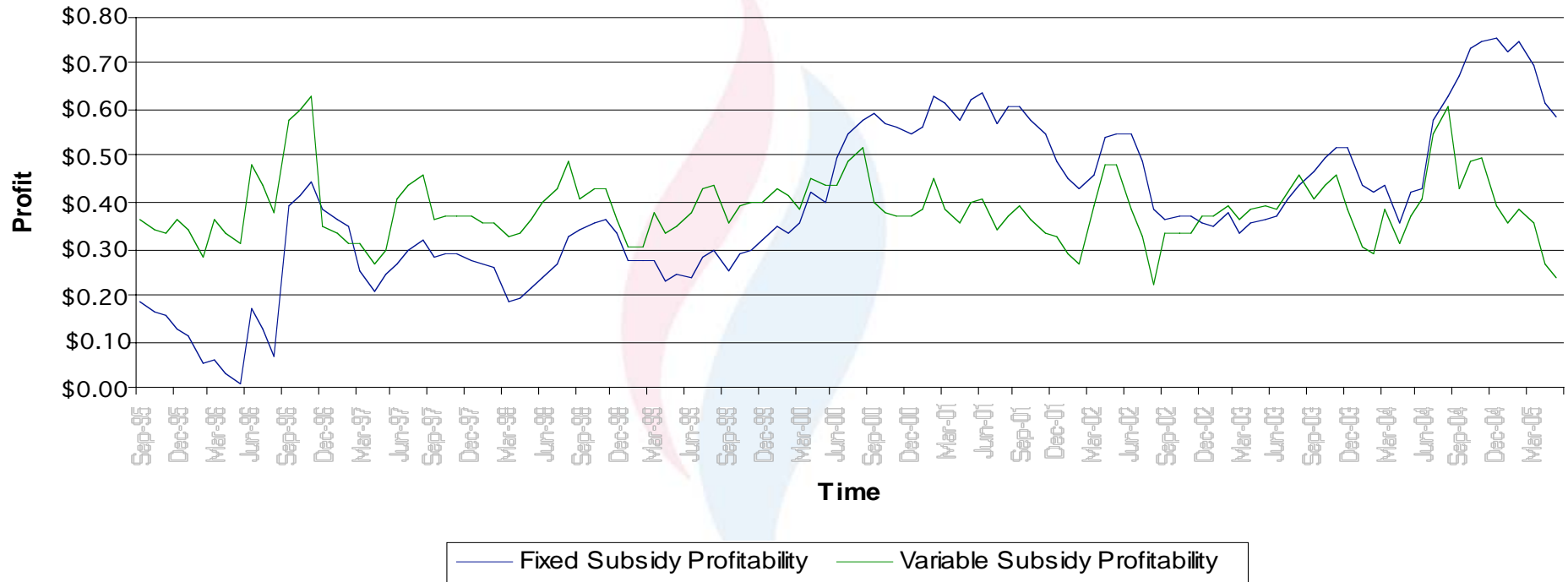
- What alternatives should be considered?
 - Technology specific alternatives
 - Subsidies that vary with market conditions
 - If there are compelling reasons, subsidy mechanism could differ by source
 - Purchase or price guarantees
 - Generic alternatives
 - Variable subsidy tied to the crude oil price
 - Floor price for crude oil

- Corn based ethanol variable subsidy
 - The main determinants of the profitability of corn based ethanol are corn and ethanol prices.
 - A subsidy that changes as these prices change could reduce risk more for the private sector and also reduce government cost compared to the current fixed subsidy.

Locus of Zero Subsidy Ethanol and Corn Prices



Fixed and Variable Subsidy Profitability



- A variable subsidy could reduce government cost and at the same time reduce private sector investment risk.
- If the variable subsidy were in effect today, the cost for the first half of 2006 would be \$0, but producers would be protected from future oil price drops or corn price increases.

- For other ethanol sources, a variable subsidy would be based on gasoline prices alone.
- As the corn ethanol industry grows, the corn portion of the subsidy could be phased out to prevent undue pressure on corn prices from ethanol production.

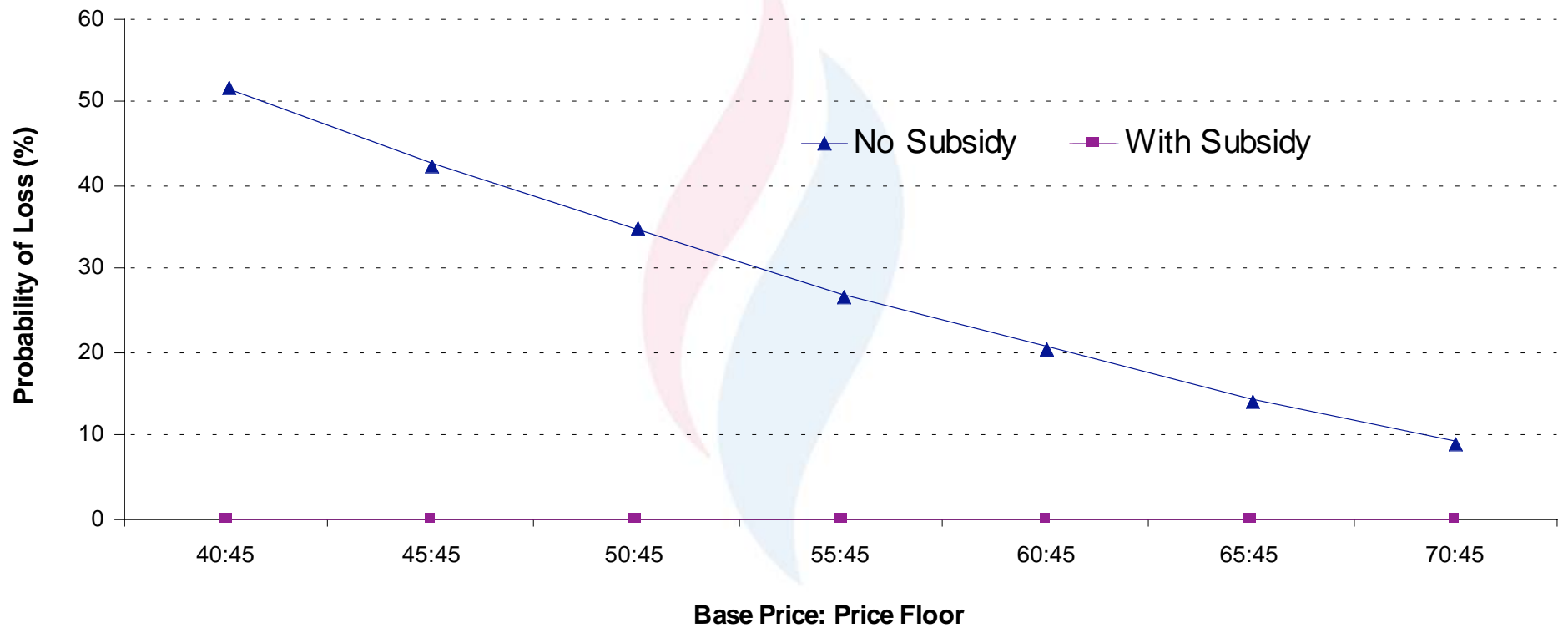
- For coal liquids or cellulose ethanol, one option would be a subsidy that varies with the price of crude oil – this option could be structured to function like a floor price for the domestic alternative.
- Another option would be a purchase guarantee in which companies would bid for contracts to sell biomass or coal liquids.
 - In this option, the government would not actually take possession of the product, but would resell in the market

- Our analysis to date has been done for a 60,000 b/d coal liquids plant with CO₂ sequestration.
 - The capital cost of this plant is \$3.9 billion.
 - We use a total life of 25 years with an 8% debt rate, 15% return on equity, and 33% equity financing.
 - The plant uses Midwestern bituminous coal.

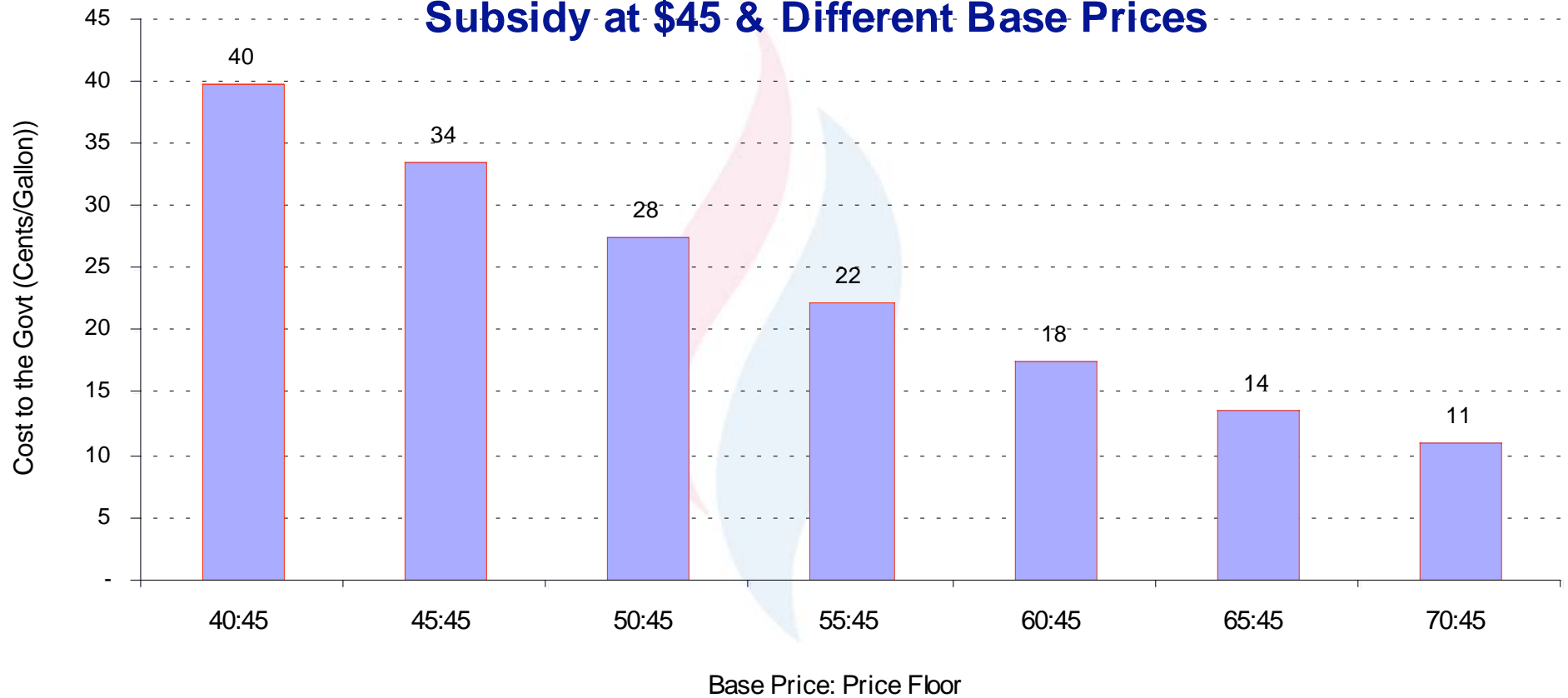
- Uncertainty is incorporated in capital cost and future oil prices:
 - Oil price uncertainty was incorporated using price variability over the past 25 years (in inflation adjusted terms) and a range of base prices from \$40 through \$70.
- The break-even cost of producing diesel fuels from this plant is estimated at a crude oil equivalent of \$43/bbl.

- The simulations were done using a subsidy in the event the crude oil price in any given year falls below \$45.
- So a crude price of \$45 becomes the floor for the plant, but in years with higher prices, market prices prevail.
- In the graphs that follow, we present:
 - the probability of a loss at each base price with and without the subsidy, and
 - the expected government cost of the subsidy policy

Probability of Loss With and Without the Floor Price Subsidy at \$45



Government Cost of a Floor Price Based Subsidy at \$45 & Different Base Prices



- The bottom line is that with base prices ranging between \$55 and \$70 per barrel, the expected cost to the government would range between 11 and 22 cents per gallon of fuel produced.
 - Of course, if oil remains above \$45, the actual cost would be zero.
 - So if the national security cost of imported oil is greater than 11-22 cents per gallon, the nation would benefit from this policy.

- Remember that we said earlier that the national security cost of imported oil has been estimated to range between \$1.70 and \$3.40 per gallon of liquid fuel
- So even if we believe the central tendency of future oil prices is around \$55, the benefit/cost ratio of the price floor policy is about 8-16 to 1. That is, our nation gains \$8-\$16 for every \$1 we spend on the price floor policy.

- The approach used for these policy analyses for coal liquids can also be used for cellulose based bio-fuels.
- In addition, a similar approach can be used to estimate the impacts of a generic price floor on crude oil. In this case, there would be a national security premium applied to the market price of domestic and imported crude in the event the market price fell below \$45.

- The basic differences between government subsidies and a comprehensive national oil floor price are as follows:
 - The subsidy approach comes from government budget resources.
 - The national floor price would actually generate government revenue, which could be used to lower taxes and fund alternative fuels research.

- More differences:
 - The technology specific subsidy would be limited to only the quantities produced in plants eligible for the government subsidies, so the average cost to consumers/taxpayers would be lower.
 - The generic oil price floor would apply to all crude oil and domestic alternatives, so consumer costs would be higher, but the application much broader.

- These results should be considered preliminary but illustrative of the kinds of policy analyses needed to develop and inform good energy policy.
- The analyses done here are built upon relatively detailed engineering and economic analysis and illustrate the advantages of multidisciplinary approaches to policy analysis.

- To achieve the objectives we have been discussing today, we need not only good energy policy but much more research to advance development of domestic alternatives.
- If you think of the cost of that research in terms of \$ per gallon as we did for the national security cost, it would amount to just pennies per gallon.
- We could pay both the expected cost of the risk reduction policies and for the needed research and still be far below the national security cost we are paying today - each and every day.



Thank You